

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application: Claims 1-39 have been withdrawn. Claims 40-65 are pending.

**Listing of Claims:**

1. (Withdrawn) A method of growing a CdS/ZnS graded shell, comprising:  
providing a core,  
combining the core with at least one surfactant,  
heating the mixture,  
combining the mixture with a CdS/ZnS stock solution,  
wherein the core comprises a semiconductor material, and  
graded core/shell nanorods are produced.
2. (Withdrawn) The method of claim 1, wherein:  
the core is rod shaped.
3. (Withdrawn) The method of claim 2, wherein:  
the core comprises CdSe.
4. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 1, wherein:  
the mixture is heated to a temperature between 100-360 °C.
5. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 1, wherein:  
the mixture is heated to a temperature of 160°C.
6. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 1, wherein:  
the core is combined with only one surfactant.
7. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 1, wherein:  
the surfactant is chosen from the group consisting of TOPO, TBP, HDA, HPA and  
TDPA.
8. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 1, wherein:

the mixture is kept at a temperature of approximately 160° for between 5 minutes and 24 hours after combining the CdS/ZnS stock solution.

9. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 8, wherein:  
the mixture is kept at a temperature of 160°C for 10 minutes after combining the CdS/ZnS stock solution.
10. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 1, wherein:  
the core is a shaped nanorod.
11. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 10, wherein:  
the core has a tetrapod shape.
12. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 1, wherein:  
the graded core/shell nanorods are photochemically annealed.
13. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 12, wherein:  
the annealing is done using an Ar<sup>+</sup> laser.
14. (Withdrawn) A method of growing a CdS/ZnS graded shell, comprising:  
providing a core/surfactant mixture,  
heating the mixture,  
combining the mixture with a CdS/ZnS stock solution.
15. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 14, wherein:  
the core is rod shaped.
16. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 15, wherein:  
the core comprises CdSe.
17. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 14, wherein:  
the mixture is heated to a temperature between 100-360 °C.
18. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 14, wherein:

the mixture is heated to a temperature of 160°C.

19. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 14, wherein:

the core/surfactant mixture contains only one surfactant.

20. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 14, wherein:

the surfactant is chosen from the group consisting of TOPO, TBP, HDA, HPA and TDPA.

21. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 14, wherein:

the mixture is kept at a temperature of approximately 160° for between 5 minutes and 24 hours after combining the CdS/ZnS stock solution.

22. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 21, wherein:

the mixture is kept at a temperature of 160°C for 10 minutes after combining the CdS/ZnS stock solution.

23. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 14, wherein:

the core is a shaped nanorod.

24. (Withdrawn) The method of growing a CdS/ZnS graded shell of claim 23, wherein:

the core has a tetrapod shape.

25. (Withdrawn) A method of growing a graded core/shell semiconductor nanorod, comprising:

providing a semiconductor nanorod core,

combining the core with at least one surfactant,

heating the surfactant/core mixture,

combining the mixture with a solution,

wherein said solution comprises semiconductor precursors in molar ratio sufficient to cause the growth of a graded semiconductor shell on the core.

26. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the semiconductor nanorod core comprises a semiconductor material selected from the group consisting of Group II-VI, Group III-V and Group IV semiconductors.
27. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the core is rod shaped.
28. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the core comprises CdSe.
29. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the mixture is heated to a temperature between 100-360 °C.
30. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 29, wherein:  
the mixture is heated to a temperature of 160°C.
31. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
only one surfactant is combined with the core.
32. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the surfactant is chosen from the group consisting of TOPO, TBP, HDA, HPA and TDPA.

33. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the mixture is kept at a temperature of approximately 160° for between 5 minutes and 24 hours after combining the solution.
34. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 33, wherein:  
the mixture is kept at a temperature of 160°C for 10 minutes after combining the solution.
35. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod 25, wherein:  
the core is a shaped nanorod.
36. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 35, wherein:  
the core has a tetrapod shape.
37. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the graded core/shell nanorod is photochemically annealed.
38. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 37, wherein:  
the annealing is done using an Ar<sup>+</sup> laser.
39. (Withdrawn) The method of growing a graded core/shell semiconductor nanorod of claim 25, wherein:  
the core comprises CdSe and the graded shell comprises CdS/ZnS.

40. (Original) A graded core/shell semiconductor nanorod comprising:
- at least a first segment comprising:
  - a core comprising a Group II-VI, Group III-V or a Group IV semiconductor,
  - a graded shell overlying the core,
  - wherein the graded shell comprises at least two monolayers,
  - wherein the at least two monolayers each independently comprise a Group II-VI, Group III-V or a Group IV semiconductor.
41. (Original) The graded core/shell semiconductor nanorod of claim 40, wherein:
- the graded shell has at least three monolayers, and
  - the monolayer closest to the core comprises a first semiconductor material, and
  - the outermost monolayer comprises a second semiconductor material, wherein
  - between the monolayer closest to the core and the outermost monolayer there exists a concentration gradient of the first and second semiconductor material.
42. (Original) The graded core/shell semiconductor nanorod of claim 40, wherein:
- the number of monolayers is between two and eight.
43. (Original) The graded core/shell semiconductor nanorod of claim 42, wherein:
- the number of monolayer is between 2 and 6.
44. (Original) The graded core/shell semiconductor nanorod of claim 40, wherein:
- there is a tail extending longitudinally from the core.
45. (Original) The graded core/shell semiconductor nanorod of claim 40, wherein:
- the core comprises CdSe and the graded core/shell comprises CdS/ZnS.
46. (Original) The graded core/shell semiconductor nanorod of claim 40, wherein:
- there is joined to the first segment a second segment comprising:
  - a core comprising a Group II-VI, Group III-V or a Group IV semiconductor,

a graded shell overlying the core,

wherein the graded shell comprises at least two monolayers,

wherein the at least two monolayers each independently comprise a Group II-VI, Group III-V or a Group IV semiconductor.

47. (Original) The graded core/shell semiconductor nanorod of claim 46, wherein:

the second segment core comprises CdSe and the second segment graded shell monolayers comprise, in order, CdS/ZnS.

48. (Original) The graded core/shell semiconductor nanorod of claim 47, wherein:

the first and the second segments have different cross sectional areas.

49. (Original) The graded core/shell semiconductor nanorod of claim 47, wherein:

there is a third segment joined to the second segment.

50. (Original) The graded core/shell semiconductor nanorod of claim 49, wherein:

the first, second and third segments have different cross sectional areas.

51. (Original) A nanorod barcode, comprising:

a first segment of a first material; and

a second segment of a second material joined longitudinally to said first segment;

wherein at least one of the first and second segments is capable of generating emission in response to excitation energy.

52. (Original) The nanorod barcode of claim 51, wherein:

said first and second segments comprise a nanorod core, and

said first and second segment cores independently comprise either a semiconductor

material selected from the group consisting of Group II-VI, Group III-V and Group IV

semiconductors or a metal selected from the group consisting of transition metals, oxides and nitrides thereof.

53. (Original) The nanorod barcode of claim 52, wherein:
- said first and second segment cores independently comprise a semiconductor material selected from the group consisting of Group II-VI, Group III-V and Group IV semiconductors.
54. (Original) The nanorod barcode of claim 52, wherein:
- said first segment core comprises a metal selected from the group consisting of transition metals, oxides and nitrides thereof, and
- said second segment comprises a semiconductor material selected from the group consisting of Group II-VI, Group III-V and Group IV semiconductors.
55. (Original) The nanorod barcode of claim 52, further comprising:
- a third segment connected longitudinally to said first segment core, and
- said third segment core comprising a semiconductor material selected from the group consisting of Group II-VI, Group III-V and Group IV semiconductors.
56. (Original) The nanorod barcode of claim 55, wherein:
- said second and third segments have different cross sectional areas.
57. (Original) The nanorod barcode of claim 55, wherein:
- said first segment core comprises Co, and said second and third segment cores comprise CdSe.
58. (Original) The nanorod barcode of claim 53, wherein:
- said first and second segments have different cross sectional areas.
59. (Original) The nanorod barcode of claim 58, wherein:
- at least one of said first and second segment cores have a graded shell overlying the core.
60. (Original) The nanorod barcode of claim 58, wherein:
- both segment cores have a graded shell overlying said cores.



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61. (Original) The nanorod barcode of claim 53, wherein:
- there is a third segment joined longitudinally to said second segment, and
- said third segment comprises a semiconductor material selected from the group consisting of Group II-VI, Group III-V and Group IV semiconductors.
62. (Original) The nanorod barcode of claim 61, wherein:
- at least one of said first and second and third segment cores have a graded shell overlying the core.
63. (Original) The nanorod barcode of claim 62, wherein:
- all segment cores have a graded shell overlying the cores.
64. (Original) The nanorod barcode of claim 55, wherein:
- said first, second and third segments have different cross sectional areas.
65. (Original) A method of using a nanorod barcode to identify an element, comprising:
- labeling at least one identifiable element with at least one nanorod barcode as claimed in claim 51.